

**AMENDMENTS**

**IN THE CLAIMS:**

*Please cancel claims 8-10, amend claims 1-2 and 4-5, and add new claims 11-16 as follows below.*

1. (Currently amended) A copper interconnect structure, comprising:
  - a semiconductor substrate;
  - a dielectric layer over said semiconductor substrate;
  - a trench in said dielectric layer, the trench comprising a vertical surface and a horizontal surface;
  - a barrier layer in said trench wherein said barrier layer comprises a material from the group consisting of iridium (Ir), ruthenium (Ru), rhodium (Rh), rhenium (Re), platinum (Pt), and palladium (Pd), and wherein the barrier layer has a thickness associated with the horizontal surface of the trench that is different than that associated with the vertical trench surface; and
  - copper filling said trench over said barrier layer.
  
2. (Currently amended) The copper interconnect structure of claim 1 further comprising:
  - a via in said dielectric layer;
  - a trench in said dielectric layer, the via and trench each comprising a vertical surface and a horizontal surface;
  - a barrier layer in said via wherein said barrier layer comprises a material from the group consisting of iridium (Ir), ruthenium (Ru), rhodium (Rh), rhenium (Re), platinum (Pt), and palladium (Pd), and wherein the barrier layer has a thickness associated with the horizontal surfaces of the via and trench that is different than that associated with the vertical via and trench surfaces; and
  - copper filling said via over said barrier layer.

3. (Original) The copper interconnect structure of claim 2 wherein said via is positioned beneath said trench.

4. (Currently amended) A copper interconnect structure, comprising:  
a semiconductor substrate;  
a dielectric layer over said semiconductor substrate;  
a trench in said dielectric layer, the trench comprising a vertical surface and a horizontal surface;  
a first barrier layer in said trench wherein said barrier layer comprises a material from the group consisting of iridium oxide, ruthenium oxide, rhodium oxide, rhenium oxide, platinum oxide, and palladium oxide, and wherein the barrier layer has a thickness associated with the horizontal surface of the trench that is different than that associated with the vertical trench surface; and  
copper filling said trench over said barrier layer.

5. (Currently amended) The copper interconnect structure of claim 4 further comprising:  
a via in said dielectric layer;  
a trench in said dielectric layer, the via and trench each comprising a vertical surface and a horizontal surface;  
a first barrier layer in said via wherein said first barrier layer comprises a material from the group consisting of iridium oxide, ruthenium oxide, rhodium oxide, rhenium oxide, platinum oxide, and palladium oxide, and wherein the barrier layer has a thickness associated with the horizontal surfaces of the via and trench that is different than that associated with the vertical via and trench surfaces; and  
copper filling said via over said barrier layer.

6. (Original) The copper interconnect structure of claim 5 wherein said via is positioned beneath said trench.

7. (Original) The copper interconnect of claim 6 further comprising a second barrier layer wherein said barrier layer comprises a material selected from the group consisting of iridium (Ir), ruthenium (Ru), rhodium (Rh), rhenium (Re), platinum (Pt), and palladium (Pd).

8-10. (Canceled).

11. (New) The copper interconnect structure of claim 1, wherein the horizontal surface barrier layer thickness is greater than the vertical surface barrier layer thickness.

12. (New) The copper interconnect structure of claim 11, wherein a ratio of horizontal surface barrier layer thickness to vertical surface barrier layer thickness is about 5:1.

13. (New) The copper interconnect structure of claim 4, wherein the horizontal surface barrier layer thickness is greater than the vertical surface barrier layer thickness.

14. (New) The copper interconnect structure of claim 13, wherein a ratio of horizontal surface barrier layer thickness to vertical surface barrier layer thickness is about 5:1.

15. (New) A copper interconnect structure, formed by the process of:  
forming a trench in a dielectric layer overlying a semiconductor substrate, the trench comprising a vertical surface and a horizontal surface;  
forming an initial barrier layer in the trench *via* a substantially conformal deposition process, wherein a thickness of the initial barrier layer is substantially the

same on the vertical and horizontal surfaces of the trench, wherein the initial barrier layer is selected from the group consisting of iridium (Ir), ruthenium (Ru), rhodium (Rh), rhenium (Re), platinum (Pt), palladium (Pd), and oxides thereof;

forming a subsequent barrier layer in the trench *via* a substantially non-conformal deposition process, wherein a thickness of the subsequent barrier layer on the horizontal surface of the trench is greater than on a vertical trench surface; and

filling the trench with copper after the formation of the subsequent barrier layer.

16. (New) The interconnect structure of claim 15, wherein the substantially conformal deposition process comprises chemical vapor deposition, and the substantially non-conformal deposition process comprises physical vapor deposition.